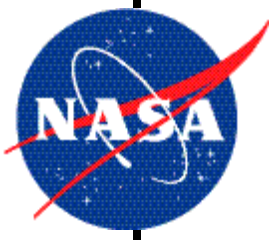
# Dryden Flight Research Center Implementation Plan

January 2001




National Aeronautics and Space Administration

Dryden Flight Research Center
Edwards, California

## Director's Message

As I reflect back on the year 2000, I am proud of the many contributions and successes achieved at the Dryden Flight Research Center. The past year has been one of transition and change. While working hard to pass the torch of knowledge from one generation of employees to the next, Dryden has successfully achieved our major goals in both the technical and managerial arenas. I look forward to the year 2001 and the new and ever more challenging goals established by the Agency. I am confident that Dryden and all Center employees are up to the challenges ahead and will again excel at meeting our commitments to both internal and external customers, as well as assist the Agency in meeting the National goals established.

Ensuring employee, workplace, and flight safety remains the most important objective at Dryden. We made significant progress in reducing employee injuries at the Center this last year and with the establishment of the Make Dryden Safer project in 2001, we will make even more progress toward improving our workplace safety and environment. I am confident that our flight and mission safety efforts will continue to excel as we integrate additional range safety, systems safety, and systems engineering improvements into our everyday operations. Further implementation of the recommendations of NASA's Integrated Action Team will also focus and improve our safety efforts in 2001.

Dryden's successes in 2000 are far-reaching and supported by customers from industry, universities and other government organizations. As we enter 2001 and beyond, we will engage in new research and technology directions in Intelligent Systems, Space Access, Revolutionary Aeronautics, and Airborne Science. The goals to be accomplished by Dryden in 2001 are very exciting and I look forward to reporting on our successes at the end of the year.

This 2001 Dryden Implementation Plan is intended to provide our customers, partners, product users and employees a clear vision of our commitments for 2001, and the roles and responsibilities of the Center and its employees. It summarizes our 2000 achievements and outlines our goals and objectives for 2001. This plan will help ensure Dryden remains at the leading edge of aerospace research and technology.

Kevin L. Petersen

Director, Dryden Flight Research Center

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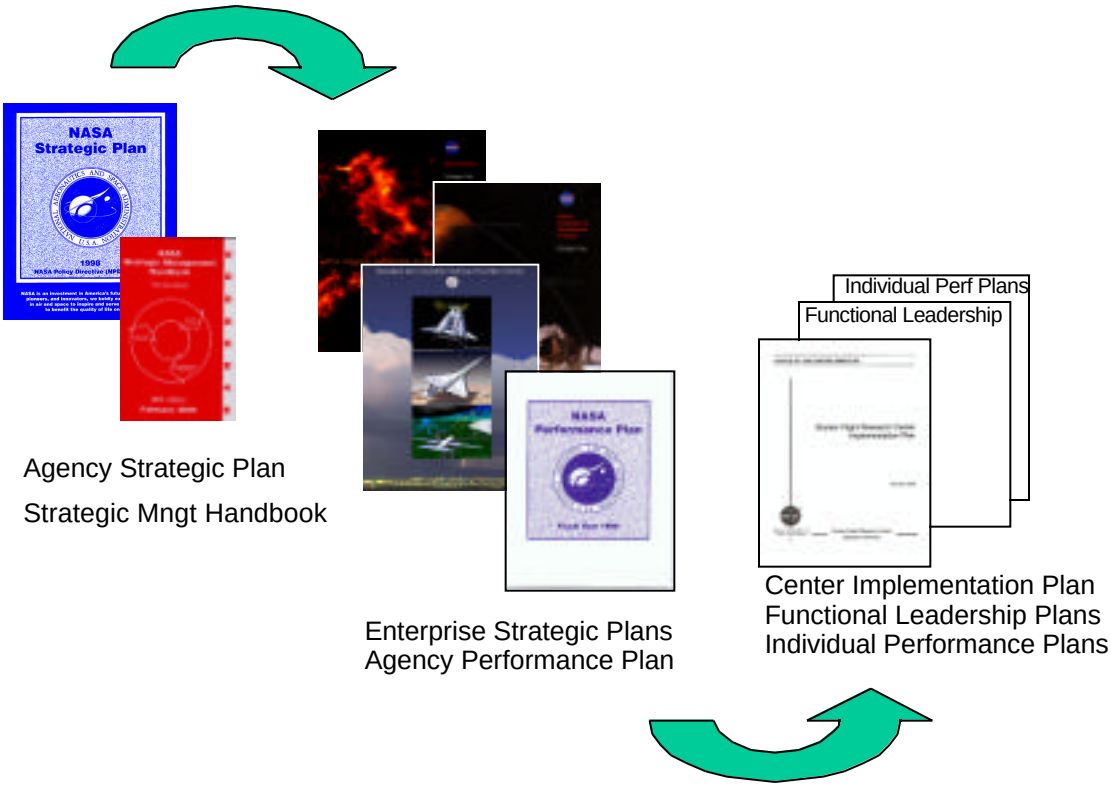
# 1 Introduction

The Dryden Flight Research Center (DFRC) Implementation Plan draws from key Agency strategic, performance, and operating plans. It consolidates our commitments to our primary customers, and explains how we integrate with other centers and external organizations. It also identifies in one document our program support responsibilities, and ultimately the role of individual organizations and employees at DFRC.

NASA has structured top-level strategic planning in a straightforward manner defined in the Strategic Management Handbook published in February 2000. The Strategic planning process is an alignment of NASA's Strategic Plan, the Enterprise Strategic Plans, programs, and institutional capabilities. The Center Implementation Plan correlates that alignment at Dryden

Finally, there are Agency-level crosscutting processes common across the enterprises. The Center Implementation Plan collects and integrates Center commitments from those external requirements. The Center intends for both its employees and its customers to use this plan as a reference for the year's planned activities and how they relate to the Agency as a whole.

## Strategic Planning Hierarchy of Documentation



# 2 Vision, Mission, and Values

## Vision

NASA Dryden is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

## Mission — Flight Research

DFRC's mission is to provide world-leading accomplishments in flight research for discovery, technology development, and technology transfer for U.S. aeronautics and space preeminence. This will be done through these specific emphasis areas:

- Conduct aerospace flight research in support of global civil aviation, revolutionary technology leaps, and space transportation
- Support development and operations of the Space Shuttle and future access-to-space vehicles
- Conduct airborne science mission and flight operations
- Develop piloted and uninhabited aircraft testbeds for research and science missions

SR-71 Shuttle landing ER-2 X-33

**Values** — The elements that tie everything together

Integrity — We are committed to delivering on our promises and are accountable for our performance to our customers, suppliers, and coworkers

Safety — Safety permeates everything we do at Dryden and our entire workforce is committed to safety as a priority in accomplishing our missions, and in protecting the general public, astronauts and flight crews, employees, and high-valued assets.

People — Our greatest strength is our highly skilled diverse workforce. We foster an environment built on a culture of trust, respect, communication, creativity, and continual improvement.

Excellence — We provide flight research products and services that satisfy our customers every time.


NASA Dryden 50th Anniversary (1996)

# 3 Meeting the NASA Mission

NASA uses a variety of means to organize and focus the efforts of the Centers to achieve Agency missions. The primary organizations and initiatives are Strategic Enterprises, Centers of Excellence, and Lead Centers for technical programs

DFRC, as an institution, is assigned to the Office of Aerospace Technology (OAT) Enterprise. Therefore, the strategic plan of that enterprise serves as the principal long-range planning guidance governing DFRC's operations. Strategic Plans from other enterprises requiring support from DFRC also play a role.

## Centers of Excellence

Dryden research aircraft fleet on ramp

As stated in the Strategic Management Handbook, Centers of Excellence (COE) are focused, Agency-wide leadership responsibilities in a specific area of technology or knowledge. They are chartered with a clear definition of their capabilities and boundaries. They are not program entities, but fiscally supported by program and/or institutional resources with funding flowing from the Strategic Enterprises.

The designation as a Center of Excellence brings several responsibilities to the Center. It is charged to be preeminent within the Agency, if not worldwide, with respect to the human resources, facilities, and other critical capabilities associated with the particular area of excellence. The Center of Excellence must strategically maintain or increase the Agency's preeminent position in the assigned area of excellence in line with the program requirements of the Strategic Enterprises and the long-term strategic interests of the Agency.

***Dryden is the Center of Excellence for Atmospheric Flight Operations***

Helios

Atmospheric flight operations are the enabling context within which experimental flight research can be conducted. It is like the laboratory in which new discoveries are made involving the ultimate immersion in the real-world operational environment. Of crucial importance is the conduct of flight tests and atmospheric science-platform operations in a safe and dependable manner. Safety is paramount, with the need for a disciplined approach to risk management throughout all phases of a mission. In order to provide a safe environment for atmospheric flight operations, a secure climate, in terms of people, information, and property, must be maintained.

## Lead Center Programs

As stated in the Strategic Management Handbook, each NASA program is assigned to a Lead Center for implementation. In making such assignments, the Enterprise Associate Administrators consider Center mission and Center of Excellence responsibilities

### *Dryden's Lead Center Responsibility in Support of Agency Programs is Flight Research R&T*

The Aerospace Flight Research Program is one of seven elements within the Aerospace R&T base programs. A prominent program element contributing to the Revolutionary Technology Leaps goal in the OAT enterprise. Segments of the Flight Research R&T base included the very high-altitude, long-endurance remotely piloted aircraft technology which is being developed under the Environmental Research Aircraft and Sensor Technology (ERAST) program. Another segment, Revolutionary Concepts (RevCon), started in FY00 and will conduct flight research into advanced vehicle concepts. Other program elements include, specific flight research activities carried out on dedicated experimental aircraft such as the Active Aeroelastic Wing (AAW) and flight research conducted through use of high-performance testbed aircraft such as the F-15 and F-18. This flight research is essential in transitioning technology developed in other Aerospace R&T base programs to the aerospace industry.

F-18 chase plane

The Aerospace Flight Research R&T Program also provides for continuing development of flight test tools and techniques to improve accuracy of measurements as well as enable greater efficiency and safety in the conduct of flight research. Collaboration with academia to infuse leading-edge ideas into the flight realm is provided through the UCLA/NASA Center for Flight Systems Research. Other universities are also involved through various research grants spanning the spectrum of flight research projects.

## Flight Activities Supporting Non-Dryden Lead Center Programs

Of the six other OAT Aerospace Base Programs, DFRC supports five:

- Space Transportation and Launch Technology Base (MSFC)
- Aerospace Operations Systems Base (ARC)
- Propulsion and Power Systems Base (ARC)
- Aerospace Vehicle Systems Technology Base (LaRC)
- Information Technology Base (ARC)

The Rotorcraft R&T Base is not currently supported by DFRC.

DFRC has flight project management lead on a number of flight activities that are a part of larger programs in the agency. DFRC also supports the X-33, the X-34, and the X-37 within the Focused Programs. Some of the more prominent activities are the X-43/Hyper-X flight project in the Vehicle Systems R&T Program (LaRC), and range development in support of the X-33 (MSFC and Lockheed Martin Skunk Works). DFRC also supports the

flight test element of the X-38 program (JSC) and the Space Shuttle (HEDS Enterprise) in on-orbit communications and tracking, and as an alternate landing site.


X-33


X-34


X-38


X-43

## Multi-Enterprise Support Services

DFRC has one responsibility that spans multiple enterprises, that of the Western Aeronautical Test Range (WATR). The WATR is considered a service provider under the Space Operations Management Office (SOMO).

The WATR's highest priority (accounting for approximately 24 percent of WATR activity) is on-orbit and landing support of the Space Shuttle and on-orbit support of communications with the International Space Station. This activity is performed in support of the Human Exploration and Development of Space (HEDS) Enterprise.

The majority of WATR activity is performed in support of the Aerospace Technology Enterprise. Almost 63 percent of WATR resources are expended in enabling the many Aerospace Technology flight research programs.

The WATR provides occasional, but important, support for airborne science missions (Earth Sciences Enterprise). The WATR may support testing of an Earth Sciences sensor on an OAT aircraft. Often, activities involve support of other agencies as well. This other-agency support may be provided to joint programs with NASA.

## Air Force Flight Test Center/Air Force Research Laboratory/Dryden Flight Research Center Alliance

Budget constraints have created a challenge for NASA Dryden Flight Research Center (DFRC), the Air Force Flight Test Center (AFFTC), and the Air Force Research Laboratory/Propulsion Directorate (AFRL/PR), all located at Edwards Air Force Base. Building on the close relationship we already had for 50 years, DFRC and AFFTC took the initiative to create a joint working Alliance in 1995 to establish a bilateral, cooperative, and beneficial working relationship. AFRL/PR was added to the Alliance in 1999. Co-chaired by the DFRC Director, AFFTC

Commander, and the AFRL/PR Commander, the three organizations have reviewed over 200 opportunities to combine resources and manpower efforts. They have developed and implemented numerous Memoranda of Agreements (MOA) which have resulted in total savings of $2,589,000 and a one-time net cost avoidance of $12,852,000 to DFRC and total cost avoidance of $1,290,000 to AFFTC. The Alliance is an ongoing activity and new opportunities continue to be identified. The Alliance Council, established in May 1995, provides coordinated oversight and direction to DFRC/AFFTC/AFRL/PR initiatives, resulting in improved service and lower cost to all customers, both internal and external.

# 4 Technical Core Competencies

Research and technology competencies are the distinguishing integration of skills, facilities, and technological capabilities that enable DFRC to accomplish its future missions and programs and to plan totally new missions beyond the limits of current capabilities. These research and technology competencies will be essential to making advanced technologies available to NASA in the future. They differentiate DFRC from other organizations.

### Flight Research Technology

Objective: Develop a highly skilled, multidisciplinary workforce capable of bringing new concepts to flight; including technologies and tools to understand and improve piloted, unpiloted, and autonomous flight vehicles.

- Develop innovative flight tools, techniques, and skills to understand aeronautical and aerospace sciences
- Develop innovative flight testbeds to enable safe development of high-risk technologies
- Assess and evaluate revolutionary new flight vehicle and system concepts
- Develop miniaturized and flexible instrumentation systems
- Apply and access new innovative tools for data analysis
- Improve flight validation techniques
- Integrate experimental flight systems hardware and software
- Apply real-time flight-critical software development techniques

### Flight Research Safety

Objective: Develop and maintain techniques, tools, and methodologies to safely fly one-of-a-kind experimental research and support aircraft and conduct airborne science operations.

- Assess and apply new risk management tools and methodologies
- Maintain and develop qualified and experienced staff and infrastructure
- Maintain and develop processes that ensure safe flight
- Develop techniques and procedures to safely test the entire envelope of new and revolutionary vehicles
- Apply systems engineering approaches to ensure flight safety
- Maintain and develop technology and tools to assure Range System Safety

# 5 Accomplishments for Fiscal Year 2000

DFRC's FY00 accomplishments were extensive and comprehensive. Significant scheduled milestones were completed as outlined in last years Center Implementation Plan. The list below is representative of the breadth and scope of work completed at DFRC in the Fiscal Year 2000.

- Demonstrated the first step towards completing low-altitude flight of the Helios-Prototype which demonstrates a battery-powered RPV aircraft with a wingspan greater than 245 ft., and is suitable for flight to 100,000 ft. in altitude or a duration of 100 hrs. once outfitted with high-performance solar cells
- Completed development of the implementation approaches for the Helios technology commercialization
- Demonstrated continuous "Over-The-Horizon" command and control capabilities on the Proteus aircraft to extend RPA operating range from 40 nmi to 200 nmi in support of the RPA science mission requirements

Helios

- Down-selected aircraft for Code Y science missions
- Top-level System Requirements were defined and baselined and system software architecture was defined for the Blended Wing Body project
- Took delivery of the X-43/Hyper-X Launch Vehicle
- Completed experiments on the F-15B
  - ¾ UCLA Gust Monitoring and Aeroelasticity Experiment
  - ¾ Virginia Polytechnic Institute and State University (VA Tech) Skin Friction Gage, Phase I
  - ¾ Supersonic Natural Laminar Flow, Phase IA
  - ¾ Hot Wire Anemometry Instrument
  - ¾ Aircrew Personal Environmental Control System Checkout

Hyper-X

- Completed experiments on the SRA
  - ¾ AAW Parameter Identification
  - ¾ X-33 Vehicle Health Management System
  - ¾ New Flight Test Fixture Baseline Loads Database
  - ¾ Smart Skin Antenna II
  - ¾ Developed autonomous taxi software for UCAV

SRA

- Completed AFF integrated system design, station-keeping control law design and analysis, and integrated functional test of the AFF Phase 0 system in the hardware-in-the-loop simulation
- Completed X-34 A-1 upgrades and tow tests

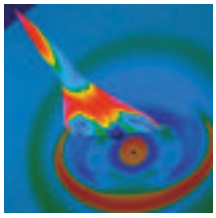
- Provided flight test support for the initial X-40A Captive Carry flight
- Took delivery of the X-40A flight test vehicle
- Took delivery of the X-38 CRV Vehicle 131R
- Supported the X-38 Vehicle 131R in its first Captive Carry flight
- Completed flight test of the X-38 Vehicle 132
- X-38 Vehicle 132 displayed at the Berlin Air Show
- B-52H Mothership project approved and started
- Selected 9 RevCon Phase 1 Projects for further competition and down-select to two to four Phase 2 flight projects beginning in FY01

X-38

- Initiated RevCon QuickStart flight projects: Autonomous Formation Flight and Pulse Detonation Engine technology demonstrators
- Deployed on three ER-2 campaigns in FY00
  - ¾ SAGE III Ozone Loss and Validation Experiment
  - ¾ Wisconsin Snow Cloud - Terra 2000 Experiment
  - ¾ Southern African Fire/Atmosphere Research Initiative 2000


- Deployed on two DC-8 campaigns in FY00
  - ¾ SAGE III Ozone Loss and Validation Experiment
  - ¾ Pacific Rim 2000 Mission
- Produced 49 publications in FY00
- Established Range Safety Systems Office
- Enhanced IT Security Plan and Education for all staff
- ISO 9000 Certification was maintained through two surveillance audits with only minor nonconformities noted
- Exceeded agency and center goals by reducing lost-time injury rate
- Exceeded the FY99 DFRC aggregate safety performance evaluation profile results in FY00
- Safety checklist for project activities implemented
- Internal close-call reporting system implemented
- Center-wide Workplace Safety Standards calendars and posters developed and distributed

# 6 Aerospace Technology Enterprise (Office of Aerospace Technology — OAT)



The Aerospace Technology Enterprise mission is to pioneer the identification, development, verification, transfer, application, and commercialization of high-payoff aerospace technologies. Research and development programs conducted by the Enterprise contribute to national security, economic growth, and the competitiveness of American aerospace companies. The Enterprise plays a key role in maintaining a safe and efficient national aviation system and enabling an affordable, reliable space transportation system.

The NASA Aerospace Technology Enterprise strategy is built on the foundation of goals — global civil aviation, revolutionary technology leaps, space transportation, and research and development services — and their accompanying objectives. DFRC conducts flight research programs of exploration, discovery, and validation to support the R&D thrusts of these goals and objectives as the Lead Center for the Flight Research R&T base program, and as a supporting center to other R&T base programs, and focused programs.

## Strategic Goal: Global Civil Aviation.

Develop an environmentally friendly global air transportation system for the next century of unquestioned safety that improves the nation's mobility.

### Objective (1R1)

Reduce the aircraft accident rate by a factor of 5 within 10 years and by a factor of 10 within 25 years (the reference baseline is Federal Aviation accident statistics for 1993 through 1996).

Performance Target (FY01):

Complete 75 percent of the conceptual designs of systems for preventing and mitigating accidents (programmatic performance indicators are listed below), and to demonstrate tools for accident analysis and risk assessment.

DFRC Performance Indicators:

- Integration of Propulsion Health Management (PHM) sensors on a C-17 engine to mitigate safety risks. [C-17/FR]

C-17

## Objective (1R2)

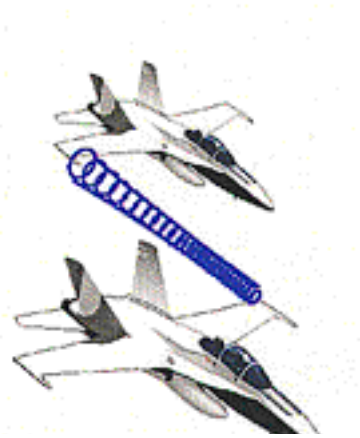
Reduce emissions of future aircraft by a factor of three within 10 years and by a factor of five within 25 years (the reference baseline is International Civil Aviation Organization 1996 emissions standards).

Performance Target (FY01):

Complete one system level technology benefit assessment, one component concept selection and one new material system.

DFRC Performance Indicators:

- Demonstrate the functionality of autonomous station keeping for a two-aircraft formation in support of establishing practical operability of precision formation flight for drag reduction, and consequently reduce fuel burn. [AFF/FR]
- Complete development, validation, and flight testing of a differential carrier-phase GPS coupled with an IMU using a Kalman filter. [AFF/FR]



Two-aircraft formation

## Objective (1R3)

Reduce perceived noise levels of future aircraft by a factor of two in 10 years, and by a factor of four in 25 years (the reference baseline is representative of 1997 production aircraft).

Performance Target (FY01):

Complete large-scale demonstration of a 2- to 5-decibel reduction in aircraft noise based on 1997 production technology, and initial assessments of concepts offering additional reduction.

DFRC Performance Indicator:

- None for FY01

## Objective (1R4)

While maintaining safety, triple the aviation system throughput in all weather conditions within 10 years (the reference baseline is 1997 operational data from the nation's top 64 airports).

Performance Target (FY01):

Complete the civil tilt-rotor project by validating databases for contingency power, flight paths, and noise reduction, as well as complete at least one demonstration of an airspace management decision support tool.

DFRC Performance Indicators:

- None for FY01

## Strategic Goal: Revolutionary Technology Leaps.

Revolutionary Technology Leaps Goal - Revolutionize air travel and the way in which air and space vehicles are designed, built, and operated.

### Objective (1R7)

Invigorate the general aviation industry, so it can deliver 10,000 aircraft annually within 10 years, and 20,000 aircraft annually within 25 years.

Performance Target (FY01):

Complete the Advanced General Aviation Transport Experiments project by validating transportation system concepts through flight test and publish design guidelines. Establish at least one partnership agreement on the Small Aircraft Transportation System program.

DFRC Performance Indicators:

- None for FY01

### Objective (1R8)

Provide next-generation design tools to increase design confidence, and cut the development cycle time for aircraft in half within 10 years.

Performance Target (FY01):

Develop at least three new design tools and accomplish at least four demonstrations of advances in computation and communications.

DFRC Performance Indicator:

- Support DFRC's core flight research technologies by completing at least 4 flight experiments on the F-15B. Projected experiments are:

  ¾ Aerostructures Test Wing
  ¾ Propulsion Flight Test Fixture
  ¾ Airborne Schlieren Imaging System
  ¾ Supersonic Natural Laminar Flow, Phase II
  ¾ Laminar Flow Experiment. [F-15B/FR]

F-15B

### Objective (1R9)

Provide next-generation experimental aircraft to increase design confidence and cut the development cycle time for aircraft in half within 10 years.

Performance Target (FY01):

Demonstrate two new concepts in flight and identify three new concepts for further examination.

DFRC Performance Indicators:

- Demonstrate solar powered UAV flight operations to 100,000 feet. [ERAST/FR]

- Demonstrate robust taxi capability with contingency planning for an autonomous vehicle. [UCAV/FR]

- Launch first Mach 7 capable airframe-powered vehicle from the B-52. [X-43/AVST]

- Launch second Mach 7 capable airframe-powered vehicle from the B-52. [X-43/AVST]

X-43

## Strategic Goal: Space Transportation

Achieve the full potential of space for all human endeavors through affordable space transportation

### Objective (1R10)

Reduce the payload cost to low-Earth orbit by an order of magnitude, from $10,000 to $1,000 per pound, within 10 years, and by an additional order of magnitude within 25 years.

Performance Target (FY01)

Complete assembly of the third X-34 test vehicle, demonstrate 75 percent of supporting technology developments (programmatic performance indicators are listed below), and complete competitive solicitations for expanded 2nd generation reusable launch vehicle efforts.

DFRC Performance Indicator:

- Complete X-40A approach and landing test series

### Objective (1R11)

Reduce the cost of interorbital transfer by an order of magnitude and travel time for planetary missions by a factor of two within 15 years (the reference baseline is representative 1997 systems).

Performance Target (FY01):

Commence X-37 vehicle assembly, and complete one pathfinder flight experiment.

DFRC Performance Indicator:

- Complete flight-testing of the X-40, an 85-percent scale test vehicle of the X-37 Space Plane Orbital Flight Demonstrator Technology Testbed. [X-40/RLV]

X-40

## Strategic Goal: Research and Development Services.

Enable, and as appropriate provide, on a national basis, world-class aerospace R&D services, including facilities and expertise

**Objective (1R12)**

Provide world-class aerospace research and development services, facilities, and expertise.

Performance Target (FY01):

Continue the solicitation of customer feedback on the services, facilities and expertise provided by the Aerospace Technology Enterprise.

DFRC Performance Indicator:

- None for FY01

**Objective (1R13):**

Provide world-class aerospace research and development services, facilities, and expertise

Performance Target (FY01):

Continue the implementation of current education outreach plans, and establish new plans for all new program activities initiated in FY01.

DFRC Performance Indicators:

- Review all student programs to rebaseline objectives and determine appropriate levels of participation and support.

# 7 Human Exploration and Development of Space (HEDS)

The Human Exploration and Development of Space (HEDS) Enterprise mission is to open the space frontier by exploring, using, and enabling the development of space to expand the human experience into space and bring the benefits of space to Earth. The Enterprise mission includes the development of innovative technologies that support HEDS programs and make them available for other applications that provide benefits to the Nation. Knowledge and discoveries will be shared with the public to enhance science, mathematics, and technology education and increase the scientific and technological literacy of all Americans.

The Office of Space Flight (OSF) strategy to contribute to the HEDS mission is focused on providing the infrastructure to enable research, exploration, and development. The OSF mission consists of four major components: ensure safe, reliable, and affordable access to space; establish a permanent human presence aboard an earth-orbiting research laboratory; provide a space operations infrastructure; and expand the commercial development of space.

DFRC's role in supporting the OSF strategy is to support Space Shuttle Operations and the X-38 Crew Return Vehicle (CRV) development and flight test for the ISS.

## Strategic Goal: Enable and establish a permanent and productive human presence in Earth orbit.

### Objective (1H7)

Provide safe and affordable access to space.

Performance Target (FY01):

The Office of Space Flight continues to invest in Space Shuttle operations. Investments include hardware production, ground processing, launch and landing operations, flight crew operations, training, logistics, and sustaining engineering. The performance target is to achieve 8 or fewer flight anomalies per mission.

DFRC Performance Indicator:

- Support Shuttle Operations through landing operations support, providing atmospheric flight dynamics consultation and analysis (through participation in specialist team activities), and providing on-orbit communications through the Western Aeronautical Test Range and an alternate landing site for the Shuttle. [Launch and Landing Operation/Shuttle Operations]

Shuttle landing

## Agency Objective (1H15)

Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives.

Performance Target (FY01):

Successfully complete no less than 75 percent of the planned crew return capability schedules.

DFRC Performance Indicator:

- Conduct flight testing of the X-38 CRV V131R, prototype for a low-cost crew return vehicle for the Space Station. [International Space Station/Office of Space Flight]

X-38 CRV

## Crosscutting Target (1H29):

Performance Target (FY01):

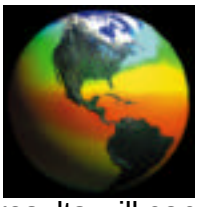
Improve health of the NASA workforce.

DFRC Performance Indicator:

- Develop and implement supervisor-specific and staff level training for the identification and management of stress in the work units at least twice in FY01.

- Develop and implement a formal plan for 100-percent review of all medical 911 emergencies, and a peer review program for medical records.

# 8 Earth Science (ESE)



The Earth Science Enterprise (ESE) mission is to understand the total Earth system and the effects of natural and human-induced changes on the global environment. The programs of the ESE advance the new discipline of Earth System Science, with a near-term emphasis on global climate change. Both space and ground-based capabilities yield new scientific understanding of Earth and practical benefits to the nation. The research results will contribute to the development of environmental policy and economic investment decisions. The ESE mission includes the development of innovative technologies to support Earth Science programs and make them available for solving practical societal problems in agriculture and food production, water resources, and national resource management that provide benefits to the nation. Knowledge and discoveries will be shared with the public to enhance science, mathematics, and technology education as well as increase the scientific and technological literacy of all Americans.

The Airborne Science Program at DFRC supports the ESE mission through scheduled aircraft and field campaigns by performing aircraft/sensor integration, aircraft operations, and mission management

## Strategic Goal: Expand scientific knowledge by characterizing the Earth system.

**Objective (1Y3):**

Understand the causes and consequences of land-cover and land-use change and determine how land-cover and climate changes affect agricultural productivity and terrestrial and marine ecosystem health.

Performance Target (FY01):

Explore the dynamics of the global carbon cycle by developing, analyzing, and documenting at least three multi-year data sets.

DFRC Performance Indicator:

- Complete preliminary planning and arrangements for the Large Scale Biosphere-Atmosphere Experiment (LBA) in the Amazon.

**Objective (1Y6):**

Predict seasonal-to-interannual climate variation – determining how water cycles among land, oceans, and atmosphere, and the impact of these cycles on fresh water availability.

Performance Target (FY01):

Explain the dynamics of the global water cycle by building improved models and prediction capabilities, specifically improving current understanding of the large-scale effects of clouds in climate.

DFRC Performance Indicator:

- Provide mission and operations support for the Convection and Moisture Experiment (CAMEX) from Florida.

**Objective (1Y9):**

Understand the causes of variation in atmosphere ozone concentration and distribution — monitoring and predicting how atmospheric composition is changing in response to natural and human-induced factors.

Performance Target (FY01):

Explore the dynamics of atmospheric composition by developing, analyzing, and documenting at least three multi-year data sets.

DFRC Performance Indicator:

- Provide mission and operations support for the Transport and Chemical Evolution over the Pacific (TRACE-P).

ER-2

DC-8

# 9 Crosscutting Processes

Underlying NASA's activities are critical processes that are the means by which we develop and deliver our products and services to internal and external customers. In performing our jobs, all employees are engaged in one or more of these processes. Through these processes we transform inputs, such as policies and resources, into outputs, such as knowledge.

The crosscutting processes are Manage Strategically, Provide Aerospace Products and Capabilities, Generate Knowledge, and Communicate Knowledge.

In carrying out these processes, Dryden employs overarching strategies to enhance our position as a premier research Center. Effective implementation of these processes will help us deliver better products and services and cut development time and costs in current and future programs.

## Manage Strategically

*Goal:* Ensure that the Agency meets it responsibilities safely and effectively, as it allocates its resources to support NASA's strategic, implementation, and performance plans.

**Objective (1MS1):**

Assess, document, communicate, and mitigate the programmatic and technical risks associated with NASA programs and projects; focus special attention toward addressing and mitigating safety and health risks presented by our work environment and our projects.

Performance Target (FY01):

Increase the safety of the NASA infrastructure and workforce with facilities safety improvements, reduced environmental hazards, increased physical security, and enhanced safety awareness among its employees.

DFRC Performance Indicators:

- Award construction contracts to correct facility-related safety problems.
- Achieve a lost-time Civil Service employee injury rate of 0.14 or less. (The lost-time injury rate is equal to the number of lost-time injuries times 200,000, divided by the number of hours worked.)
- Exceed the FY00 DFRC aggregate safety performance evaluation profile results in FY01.
- Award all planned contracts for physical security upgrades to NASA's Minimum Essential Infrastructure.
- Establish counter-intelligence program in accordance with NASA guidelines and directives by the end of FY01. (Program Plan)
- Upgrade physical security that could compromise either mission effectiveness or safety. (Functional Initiative [FI])

**Objective (1MS2):**

Improve the effectiveness and efficiency of Agency acquisitions through the increased use of techniques and management that enhance contractor innovation and performance.

Performance Target (FY01):

Continue to take advantage of opportunities for improved contract management by maintaining a high proportion of Performance Based Contracts (PBC's) and maintain significant contractor involvement in NASA programs of small businesses, minority institutions, and minority- and women-owned businesses.

DFRC Performance Indicators:

- Maintain PBC obligations to 80 percent of funds available.
- Achieve at least an 8-percent goal for annual funding to small disadvantaged businesses.

**Objective (1MS3):**

Optimize Agency investment strategies and systems to align human, physical, and financial resources with customer requirements, while ensuring compliance with applicable statutes and regulations

Performance Target (FY01):

Renew Agency's management systems, facilities, and human resources through updated use of automated systems, facilities revitalization, and personnel training.

DFRC Performance Indicators:

- Increase availability of web-based and distance learning training opportunities by 10 percent.
- Increase number of technology assisted training instances by 20 percent.
- Award construction contracts that reduce the Center’s Backlog of Maintenance and Repair (BMAR).
- Expand the role of Reliability Centered Maintenance (RCM) to include program-related assets (non-collateral equipment) for increased mission assurance.
- Update full-cost rates and business practices by third quarter of FY01 leading toward implementation of full cost in FY03. [FI]
- By the end of FY01 all programs will meet the minimum HQ obligation and cost metrics. [FI]
- Enhance Chief Financial Officer employee staff capabilities consistent with evolving Federal and NASA requirements by providing additional knowledge, skills and/or tools to enable them to work more efficiently and effectively. [FI]

**Objective (1MS4):**

Ensure that information technology provides an open and secure exchange of information, is consistent with Agency technical architectures and standards, demonstrates a projected return on investment, reduces risk, and directly contributes to mission success.

Performance Target (FY01):

Improve IT infrastructure service delivery to provide increased capability and efficiency while maintaining a customer rating of "satisfactory" and enhance IT security through reduction of system vulnerabilities across all NASA Centers, emphasizing IT security awareness training for all NASA personnel.

DFRC Performance Indicators:

- Improve customer satisfaction metrics through implementation of the Dryden ODIN Delivery Order.
- Enhance IT Security through application of improved technology and customer education.
- Improve service delivery to internal and external customers by upgrading and enhancing the performance of the internal and public web servers.
- Improve service delivery to customers through upgrades and better control of network infrastructure.
- Provide WATR IT services to customer missions at the agreed upon PSLA levels while maintaining a customer rating of satisfactory.

## Provide Aerospace Products and Capabilities (PAPAC)

*Goal:* Enable NASA's Strategic Enterprises and their Centers to deliver products and services more effectively and efficiently while extending the technology, research, and science benefits broadly to the public and commercial sectors.

**Objective (1P1):**

Reduce the cost and development time to deliver products and operational services

Performance Target (FY01):

Meet schedule and cost commitments by keeping development and upgrade of major scientific facilities and capital assets within 110 percent of cost and schedule estimates on average.

DFRC Performance Indicators:

- None for FY01

**Objective (1P2):**

Improve and maintain NASA's engineering capability.

Performance Target (FY01):

Establish prototype collaborative engineering environments focused on the representative set of enterprise applications and evaluate performance against non-collaborative benchmarks.

DFRC Performance Indicators:

- None for FY01

**Objective (1P3):**

Improve and maintain NASA's engineering capability.

Performance Target (FY01):

Ensure the availability of NASA's spacecraft and ground facilities by decreasing the operating time lost to unscheduled downtime.

DFRC Performance Indicators:

- Minimize combined unscheduled downtime in major facilities (as defined in the NASA Major Facility Inventory) to less than 80 hours, with no impact to any mission.

- Ensure the availability of flight operations managed aircraft facilities and associated support assets and equipment by reducing unscheduled downtime by 10 percent relative to FY00 rates.

**Objective (1P4):**

Capture and preserve engineering and technological best practices and process knowledge to continuously improve NASA's program and project management.

Performance Target (FY01):

Capture a set of best practices and lessons learned from each program, to include at least one from each of the four PAPAC sub-processes documented in NPG 7120.5 commensurate with current program status. Data will be implemented in PAPAC process improvement and in Program and Project Management training.

DFRC Performance Indicators:

- Capture a set of best practices and lessons learned from each program to include at least one from each of the four PAPAC sub-processes documented in NPG 7120.5 commensurate with current program status. Data will be implemented in PAPAC process improvement and in Program and Project Management training.

**Objective (1P5):**

Facilitate the insertion of technology into all programs and proactively transfer technology, form commercialization partnerships, and integrate all innovative approaches to strengthen U.S. competitiveness.

Performance Target (FY01):

Dedicate 10 to 20 percent of the Agency's Research and Development budget to commercial partnerships.

DFRC Performance Indicators:

- Complete development of heavyweight (prototype) energy storage system (fuel cell, electrolyzer, pressure vessels, control system, and ancillaries). [ERAST/FR]

**Objective (1P6):**

Facilitate the insertion of technology into all programs and proactively transfer technology, form commercialization partnerships, and integrate all innovative approaches to strengthen U.S. competitiveness.

Performance Target (FY01):

Dedicate the percentage of technology budget that was reported in the FY00 Performance Report toward leveraging with activities of other organizations.

DFRC Performance Indicators:

- None in FY01

## Generate Knowledge

*Goal:* Extend the boundaries of knowledge, science, and engineering to capture new knowledge in useful and transferable media, and to share new knowledge with customers.

DFRC Performance Indicators:

- None for FY01

## Communicate Knowledge

*Goal:* Ensure that the Agency meets its responsibilities safely and effectively as it allocates its resources to support NASA's strategic, implementation, and performance plans.

**Objectives**

Highlight existing and identify new opportunities for NASA's customers, including the public, the academic community, and the nation's students, to participate directly in space research and discovery experience.

Improve the external constituent communities' knowledge, understanding, and use of the results and opportunities associated with NASA's programs.

**(1CK1):** Performance Target (FY01):

Convey information about, and knowledge generated by, NASA's programs to the public.

DFRC Performance Indicators:

- Provide and support exhibits to 15 major events by end of FY01 (total target audience over 150,000).
- Establish the internet on-line Exhibit Loan Program for Dryden Exhibits by end of FY01.

- Produce one monograph or historical publication by end of third quarter of FY01.
- Maintain a fine-arts program (committee) and promote public access to DFRC artwork.

**(1CK2):** Performance Target (FY01):

Assist the public and customers to locate and retrieve information on, or that has been generated by, a NASA program.

DFRC Performance Indicators:

- Improve the appearance and usability of the Dryden Public Web information through the use of auditing and monitoring tools.
- Improve the NASA web pages with upgraded sites (target of three sites) to increase searched pages by 5 percent by end of FY01.

**(1CK3):** Performance Target (FY01):

Facilitate the transfer of NASA-generated technology and innovations to private industry

DFRC Performance Indicators:

- Produce articles in *Spinoff* publication (1 article) and *Tech Briefs* publication (2 articles) by end of FY01.
- Produce 5 success stories for *Tech Tracs* database, which is accessible through the internet, by end of third quarter FY01.
- Dryden will publish 40 papers as NASA TPs, TMs, and as conference papers.

**(1CK4):** Performance Target (FY01):

Support educational excellence and reach out to the under served and under represented minority community.

DFRC Performance Indicators:

- Expand recruitment programs at minority-serving colleges and universities by 10 percent.
- Establish a Communicate Knowledge Plan for Airborne Science to include workshops and student programs for underrepresented and minority students by end of second quarter FY01.
- Produce two CD-ROM education products for educators and students (with companion web sites) by end of second quarter of FY01.
- Support the NASA Implementation Plan for Education 1999-2003 with the delivery of three Education products by end of FY01.
- Sponsor one minority university grants workshop in FY01 to foster understanding in the minority community of the NASA grants process.

## 10 Functional and Staff Office Leadership Initiative Program Commitment Agreements

The Capital Investment Council (CIC) reviews and concurs on selected initiatives proposed by Functional and Staff Offices. Once approved, a Program Commitment Agreement outlining Program Management Council review requirements is prepared and the initiative posted to the current inventory of initiatives. Below is a current list of the Agency's Functional Initiatives. Those that have application to DFRC have Performance Indicators (identified by "FI") in the implementation plan. The remainder are listed for reference.

- NASA Software Initiative
- Strategic Capabilities Planning
- System Engineering Capability Assessment and Strategies
- Reliability-Centered Maintenance (RCM) for Program Assets
- NASA Integrated Action Team (NIAT) Report
- Risk Management
- IT Infrastructure Appendix of Integrated Technology Plan
- e-NASA/e-Gov
- Cost-per-Copy II
- Full Cost Practices
- Two Appropriations
- Improving Access to Services for persons with Limited English Proficiency
- Hiring Individuals with Disabilities
- Risk-Based Acquisition Management
- Re-engineering of Grants and Agreements
- Environmental Management System – Conduct Policy Analysis
- Develop a More Robust Counterintelligence Program
- Continuity of Operations
- FBI Report Impact
- High-Definition Television and Industrial Impacts

## Appendix A: Abbreviations and Acronyms

| | |
|---|---|
| AAW | Active Aeroelastic Wing |
| ACTIVE | Advanced Control for Integrated Vehicles |
| AFF | Autonomous Formation Flight |
| AFFTC | Air Force Flight Test Center, Edwards AFB, California |
| AFO | Atmospheric Flight Operations |
| AFRL/PR | Air Force Research Laboratory/Propulsion Directorate |
| AVST | Advanced Vehicle and Systems Technology [Base Program] |
| BMAR | Backlog of Maintenance Repair |
| BWB | Blended Wing Body |
| CAMEX | Convection and Moisture Experiment |
| CD-ROM | Compact Disk-Random Operating Memory |
| CFO | Chief Financial Officer |
| CIO | Chief Information Officer |
| COE | Center of Excellence |
| CRV | Crew Return Vehicle |
| DFRC | Dryden Flight Research Center, Edwards, California |
| EOCAP | Earth Observation Commercial Applications Program |
| EPAD | Electric Powered Actuators Development |
| ERAST | Environmental Research Aircraft and Sensor Technology |
| ESE | Earth Sciences Enterprise |
| ExTRA | Extended Test Range Alliance |
| FFRDC | Federally Funded Research and Development Centers |
| FI | Functional Initiative |
| FR | Flight Research [Base Program] |
| GPRA | Government Performance and Results Act |
| GPS | Global Positioning System |
| HBCU | Historically Black College of University |
| HEDS | Human Exploration and Development of Space |
| HQ | NASA Headquarters, Washington, DC |
| IFMP | Integrated Financial Management Project |
| IMU | inertial measurement unit |
| ISS | International Space Station |
| IT | Information Technology |
| JSC | Johnson Space Center, Houston, Texas |

| | |
|---|---|
| LaRC | Langley Research Center, Hampton, Virginia |
| LBA | Large Scale Biosphere-Atmosphere Experiment |
| MOA | Memorandum of Agreement |
| MSFC | Marshall Space Flight Center, Huntsville, Alabama |
| NASA | National Aeronautics and Space Administration, Washington, D.C. |
| NIAT | NASA Integrated Action Team |
| NIX | NASA Image Exchange |
| nmi | nautical miles |
| NPG | NASA Policy Guidance |
| NPR | National Performance Review |
| OAT | Aerospace Technology Enterprise – Office of Aerospace Technology |
| ODIN | Outsourcing Desktop Initiative for NASA |
| OSF | Office of Space Flight |
| PACRIM | Pacific Rim |
| PAPAC | Provide Aerospace Products and Capabilities |
| PBC | Performance-Based Contracting |
| PHM | Propulsion Health Management |
| PHYSX | Physics Hypersonic Flight Experiment |
| PSLA | Project Service Level Agreement |
| R&D | Research and Development |
| R&T | Research and Technology |
| RAIF | Research Aircraft Integration Facility |
| RCM | Reliability Centered Maintenance |
| RESTORE | Neural Network Reconfigurable Controller |
| RevCon | Revolutionary Concepts |
| RLV | Reusable Launch Vehicle [Program] |
| RPA | Remotely Piloted Aircraft |
| RPV | Remotely Piloted Vehicle |
| SAFARI | Southern African Fire Atmosphere Research Science Initiative |
| SAGE | Stratospheric Aerosol and Gas Experiment |
| SBIR | Small Business Innovative Research |
| SOLVE | SAGE III Ozone Loss and Validation Experiment |
| SOMO | Space Operations Management Office |
| SRA | Systems Research Aircraft |
| SST | Supersonic Transport |
| STTR | Small Business Technology Transfer |

| | |
|---|---|
| TEFLUN | Texas-Florida Underflight |
| TM | Technical Memorandum |
| TP | Technical Publication |
| TPS | Thermal Protection System |
| TRACE-P | Transport and Chemical Evolution over the Pacific |
| TRMM | Tropical Rainfall Moisture Measurement |
| UAV | Unpiloted Aerial Vehicle |
| UCAV | Unpiloted Combat Air Vehicle |
| UCLA | University of California at Los Angeles, California |
| VA Tech | Virginia Polytechnic Institute and State University, Blacksburg, Virginia |
| WATR | Western Aeronautical Test Range |
| WINTEX | Winter Experiment |
| WT | Wind Tunnel |

## Appendix B: Points of Contact

| | | |
|---|---|---|
| Director | Kevin L. Petersen | (661) 276-3101 |
| Deputy Director | Wallace C. Sawyer | (661) 276-3103 |
| Associate Director | Joseph Ramos III | (661) 276-3106 |
| Associate Director for Planning | Richard Christiansen | (661) 276-3136 |
| Manager, Flight Research R&T Program | James F. Stewart | (661) 276-3162 |
| Dep. Mgr., Flight Research R&T Program | David McBride | (661)-276-2851 |
| Chief Engineer | Gary E. Krier | (661) 276-2785 |
| Chief Financial Officer | Gwendolyn V. Young | (661) 276-3915 |
| Chief Information Officer | Robert M. Hornstein | (661) 276-7950 |
| Chief, Safety and Mission Assurance Office | Vince Chacon | (661) 276-3791 |
| Director for Flight Operations | Marta R. Bohn-Meyer | (661) 276-3199 |
| Director for Research Engineering | J. Larry Crawford | (661) 276-2695 |
| Director for Research Facilities | Lawrence J. Schilling | (661) 276-3749 |
| Director for Aerospace Projects | Robert R. Meyer, Jr. | (661) 276-3707 |
| Director for Airborne Science | Gary Shelton | (661) 276-2919 |
| External Affairs Officer | J. Campbell Martin | (661) 276-3448 |
| Systems Management Office | Gary E. Krier | (661) 276-2785 |

## Appendix C: References

*NASA Strategic Plan 1998*, NASA Headquarters Office of Policy and Plans

*NASA Performance Plan 2000*, NASA Headquarters Office of Policy and Plans

*NASA Strategic Management Handbook 2000*, NASA Headquarters Office of Policy and Plans

*Blair House Papers1997*

*Earth Science Strategic Enterprise Plan 1998-2002*

*Human Exploration and Development of Space Strategic Enterprise Plan*

*Aeronautics and Space Transportation: Three Pillars for Success*

*NASA Implementation Plan for Education 1998*